**Additional Exercise for the LNMB course CO1a**
**Monday October 18, 2010**

**Exercise E.** Let $D = (V, A)$ be a directed graph, $s, t \in V$, and let $k = (k_a)_{a \in A}$ be real costs assigned to the arcs of $D$. Assume that every directed circuit $C$ in $D$ has a nonnegative cost, i.e., $\sum_{a \in C} k_a \geq 0$. Show that the zero flow is extreme; that is, if $f$ is a $s - t$ flow with value 0 then the cost of $f$ is nonnegative.

*Hint:* You may use the result of Exercise 4.15.